Model 7007-001 / Model 7007-002

EMSense™
EMF Probe Plug-In Card

User Manual

Model 7007-001 EMSense card shown

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An ESCO Technologies Company

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Revision Record

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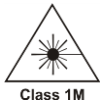
Notes, Cautions, and Warnings

Note: Denotes helpful information intended to provide tips for better use of the product.

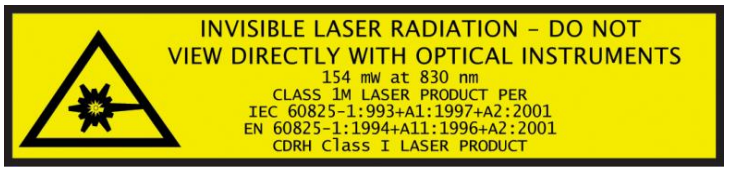
Caution: Denotes a hazard. Failure to follow instructions could result in minor personal injury and/or property damage. Included text gives proper procedures.

Warning: Denotes a hazard. Failure to follow instructions could result in SEVERE personal injury and/or property damage. Included text gives proper procedures.

Safety Information



LASER HAZARD. Laser power up to 150 mW at 830 nm may be accessible at the fiber connector of the laser. However, the laser beam itself is not hazardous as the interlock ensures that the exposure time will be less than 30 ms.


INVISIBLE LASER RADIATION – DO NOT
VIEW DIRECTLY WITH OPTICAL INSTRUMENTS
154 mW at 830 nm
CLASS 1M LASER PRODUCT PER
IEC 60825-1:993+A1:1997+A2:2001
EN 60825-1:1994+A11:1996+A2:2001
CDRH Class I LASER PRODUCT

OR

High Voltage: Indicates presence of hazardous voltage. Unsafe practice could result in severe personal injury or death.

Protective Earth Ground (Safety Ground): Indicates protective earth terminal. You should provide uninterruptible safety earth ground from the main power source to the product input wiring terminals, power cord, or supplied power cord set.

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1.0 Introduction

The **ETS-Lindgren Model 7007-001 EMSense™ EMF Probe Plug-in Card** is designed for use with the following ETS-Lindgren battery-operated field probes; the Model 7007-002 EMSense card is designed for use with the following ETS-Lindgren laser-powered field probes (sold separately). Each EMSense card can support one ETS-Lindgren probe.

Note: Contact ETS-Lindgren for information on ordering probes.

For complete information on ETS-Lindgren field probes, see the *EMC Field Probes User Manual* included with the probe.

Model 7007-001 EMSense for Battery-Operated Probes

HI-6022

HI-6053

HI-6005

Model 7007-002 EMSense for Laser-Powered Probes

HI-6122

HI-6153

HI-6105

EMSense is fully supported by ETS-Lindgren TILE!™ (Totally Integrated Laboratory Environment), ETS-Lindgren EMQuest™ Data Acquisition and Analysis Software, and other test automation software packages. Contact ETS-Lindgren for additional information.

EMCenter Modular RF Platform (Required)

The EMCenter™ Modular RF Platform is required for operation, and is sold separately.

Front Panel

Back Panel

The EMCenter may be controlled from a computer using these software products:

- ETS-Lindgren TILE!™ (Totally Integrated Laboratory Environment)
- ETS-Lindgren EMQuest™ Data Acquisition and Analysis Software
- Other test automation software

Contact ETS-Lindgren for ordering information.

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2.0 Maintenance

CAUTION: Before performing any maintenance, follow the information provided in *Safety Information* on page vi.

WARNING: Maintenance of the EMSense system is limited to external components such as cables or connectors.

If you have any questions concerning maintenance, contact ETS-Lindgren Customer Service.

Note: For maintenance information for ETS-Lindgren field probes, see the *EMC Field Probes User Manual* included with the probe.

Maintenance of Fiber Optics (If Used)

Fiber optic connectors and cables can be damaged from airborne particles, humidity and moisture, oils from the human body, and debris from the connectors they plug into. Always handle connectors and cables with care, using the following guidelines.

CAUTION: Before performing any maintenance, disconnect the fiber optic cables from the unit and turn off power.

When disconnecting fiber optic cables, apply the included dust caps to the ends to maintain their integrity.

Before connecting fiber optic cables, clean the connector tips and in-line connectors.

Before attaching in-line connectors, clean them with moisture-free compressed air.

Failure to perform these tasks may result in damage to the fiber optic connectors or cables.

Replacement and Optional Parts

Note: ETS-Lindgren may substitute a similar part or new part number with the same functionality for another part/part number. Contact ETS-Lindgren for questions about part numbers and ordering parts.

Following are the part numbers for ordering replacement or optional parts for the EMSense™ EMF Probe Plug-in Card.

Part Description	Part Number
EMSense EMF Probe Plug-in Card for Battery-Operated Probes	**7007-001:** EMSense EMF Probe Plug-in Card, Battery
EMSense EMF Probe Plug-in Card for Laser-Powered Probes	**7007-002:** EMSense EMF Probe Plug-in Card, Laser

CONTACTING ETS-LINDGREN

Note: Please see www.ets-lindgren.com for a list of ETS-Lindgren offices, including phone and email contact information.

SENDING A COMPONENT FOR SERVICE

1. Contact ETS-Lindgren Customer Service to obtain a Service Request Order (SRO).
2. Briefly describe the problem in writing. Give details regarding the observed symptom(s) or error codes, and whether the problem is constant or intermittent in nature. Please include the date(s), the service representative you spoke with, and the nature of the conversation. Include the serial number of the item being returned.
3. Package the system or component carefully. If possible, use the original packing materials or carrying case to return a system or system component to ETS-Lindgren.

3.0 Specifications

Note: For ETS-Lindgren field probe specifications, see the *EMC Field Probes User Manual* included with the probe.

Physical Specifications

Exterior Dimension:	1 slot

Environmental Specifications

Temperature Range:	0°C to 35°C (32°F to 95°F)
Relative Humidity:	10% to 90% (non-condensing)

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4.0 EMSense Plug-In Card Installation

CAUTION: : Before connecting any components, follow the information provided in *Safety Information* on page vi.

CAUTION: The EMSense card is designed to be used ONLY with the EMCenter. Do not use the card in combination with any other system.

1. Determine in which empty slot in the EMCenter™ Modular RF Platform you want to install the EMSense™ EMF Probe Controller Plug-in Card. You may use slots 1 through 7, numbered from left to right as you look at the back of the EMCenter.
2. Remove the blank panel from the slot by removing the two screws at the top of the blank panel and the two screws at the bottom.
3. Carefully insert the EMSense card into the slot of the EMCenter. Tighten the four screws.
4. Turn on the EMCenter. The EMCenter will automatically detect the newly-installed EMSense card.
5. Place the field probe in the location where the field strength is to be measured.
6. Connect the probe to the EMSense card.
7. Connect the EMCenter to a personal computer using USB, RS-232, Ethernet, or IEEE (optional).
8. Plug the interlock into the connector on the back of the EMCenter.

The card installation is complete. You can control EMSense through the EMCenter touchscreen, with ETS-Lindgren TILE!™ (Totally Integrated Laboratory Environment), ETS-Lindgren EMQuest™ Data Acquisition and Analysis Software, and other test automation software packages. Contact ETS-Lindgren for additional information.

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5.0 Operation

CAUTION: Before placing into operation, follow the information provided in *Safety Information* on page vi.

CAUTION: Prior to operation, verify that the mains voltage is within the operating range of the equipment.

EMSense Connectors and Indicators

CONNECTORS

Note: Model 7007-002 for laser-powered probes includes additional indicators; see page 22 for more information.

- Transmit (yellow)
- Receive (white)

Model 7007-001 EMSense card shown; connectors may vary for Model 7007-002

INDICATOR LEDS FOR 7007-002/LASER ONLY

LASER HOT (red)

- **Constant On:** This is a warning that the laser is running too hot and the system should be checked. Dirty fiber ends, poor in-line connections, or damaged fiber optic cables are among the causes of a **LASER HOT** warning. The system should be shut down as soon as possible, and the cause of the additional heat investigated. Continuing to run in a **LASER HOT** state may reduce the life of the laser.

- **Flash:** This is an indication that the laser current is approaching 0.8 mA. During the initialization phase of the startup process the probe receives more light; once the probe is powered and communicating, the power is rolled back to a normal level. In these instances the user may see **LASER HOT** flash on; this is normal operation.

LASER OK (blue) This is the normal status when probe communication is established and laser light is provided to the probe for power.

RECEIVE (amber) and **TRANSMIT (white)** These are illuminated during normal use.

- **RECEIVE** indicates the communication between the probe and the EMSense™ EMF Probe Plug-in Card.
- **TRANSMIT** indicates the communication between the EMCenter™ Modular RF Platform and the EMSense card.

POWER (Green) This indicates that the EMCenter recognizes the EMSense card and is providing power.

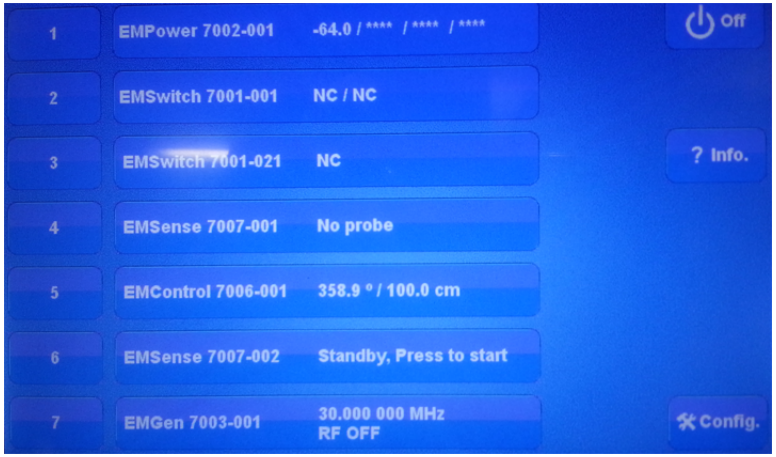
Powering On and Off EMCenter

Note: For information on using the EMCenter touchscreen, see the *EMCenter Modular Test System User Manual*.

POWER ON

Note: Verify all cards are installed correctly in the EMCenter.

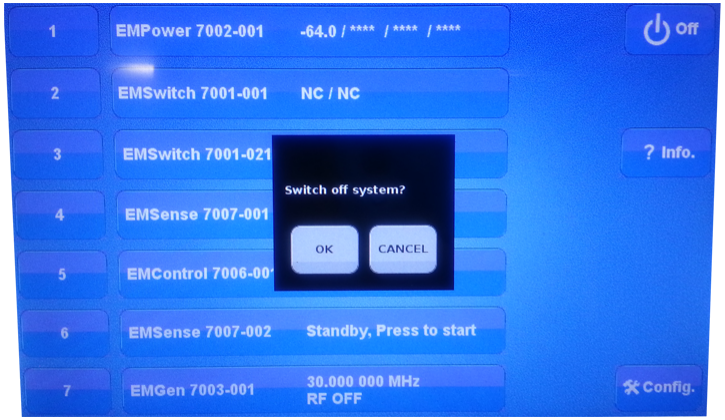
1. Plug the power cord from the mains inlet on the back panel of the EMCenter™ Modular RF Platform into a power outlet.
2. Plug the interlock jack into the interlock connector on the back panel of the EMCenter.
3. Turn the power switch located on the back panel of the EMCenter to the on position.
4. Touch anywhere on the EMCenter screen. It will take approximately 20 seconds to boot. The Information screen will flash, and then the Home screen will display.



Sample EMCenter Home Screen

POWER OFF

1. Press the **Off** button located on the EMCenter screen.



2. Press **OK** to switch off the system.

   The standby light located on the front panel of the EMCenter will flash, and then will illuminate steadily.

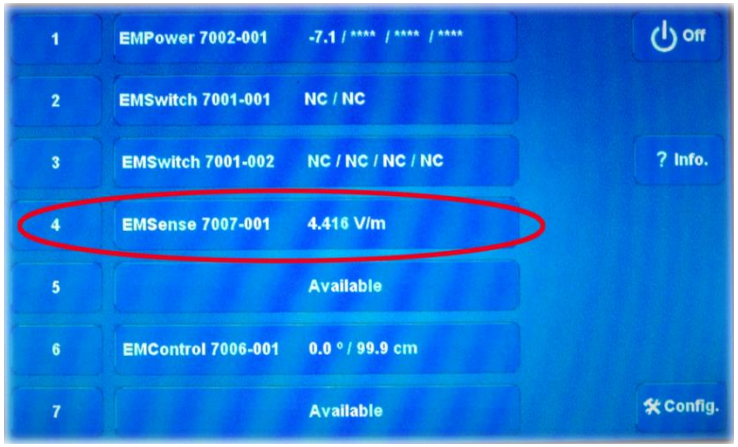
Note: When the EMCenter is in standby mode, touch the screen anywhere to reboot.

3. Turn the power switch located on the back panel of the EMCenter to the off position.
4. Remove the power cord from the power connector on the back panel of the EMCenter.
5. Remove the interlock jack from the interlock connector on the back panel of the EMCenter.

Note: For operational information for ETS-Lindgren field probes, see the *EMC Field Probes User Manual* included with the probe.

BATTERY-OPERATED FIELD PROBE DATA: FOR 7007-001 ONLY

On the Home screen the status box to the right of the slot number for the installed EMSense card displays the isotropic field strength data.

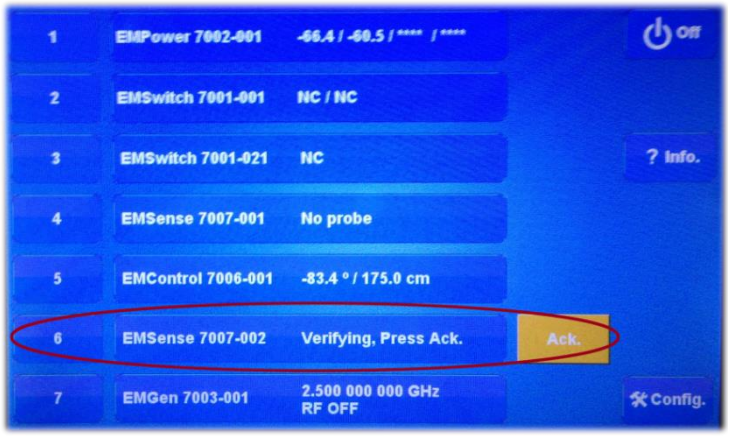


Press the status box to display the following screen:

LASER-POWERED FIELD PROBE DATA: FOR 7007-002 ONLY

On the Home screen the status box to the right of the slot number for the installed EMSense card displays the connected laser-powered field probe.

1. Press the status box and **Ack.** will display.


1 EMPower 7002-001 -66.4 / -60.5 / **** / ****
2 EMSwitch 7001-001 NC / NC
3 EMSwitch 7001-021 NC
4 EMSense 7007-001 No probe
5 EMControl 7006-001 -83.4 ° / 175.0 cm
6 EMSense 7007-002 Verifying, Press Ack.
7 EMGen 7003-001 2.500 000 000 GHz RF OFF
Off
? Info.
Ack.
Config.

2. Press **Ack.** and **LASER ON** will display on the front panel.

3. Press the status box again to display the data for the probe.

6.0 EMSense Command Set

See *EMSense Commands* on page 28 for the commands that can be used with the EMSense™ EMF Probe Plug-in Card.

Information Transfer Protocol

COMMAND STRUCTURE

See the following pages for detailed information regarding the command structure to the field probe. When the probe completes the command, it responds with a string consisting of:

- A start character (":")
- The command letter
- Data (if required)
- <LF> (a line feed)

If the command does not require the probe to return any data, the probe simply responds with the start character (":") then the command letter and a carriage return. If an error occurs, the probe responds with an error code.

EXAMPLE 1: REQUEST A READING

To request a reading from the EMSense card in slot 1 using the LAN or optional GPIB interface:

```
1:D3
```

EXAMPLE 2: REQUEST A READING

To request a reading from the EMSense card in slot 2 using the LAN or optional GPIB interface:

```
2:D3
```

Command	Description	Response
B	Read probe converter voltage	*:Bxx.xx<LF>*
BP	Read probe converter voltage in hexadecimal format	*:B64N<LF>* • *N*=safe operating level • *F*=fail level Voltage reported as 0–64; 64 corresponds to 100%

The **BP** command is provided for backward compatibility and should not be used to monitor the converter voltage, which always responds with *:B64N<LF>*.

Command	Description	Response
D3	Read probe data	*:Dx.xxxyy.yyzzz.zB<LF>* • *xxxx*, *yyyy*, *zzzz*= 4-digit axis values with floating decimal point • *B*=battery flag, *N* or *F*
D5	Read probe data	*:Dx.xxxyy.yyzzz.zcccc.B<LF>* • *xxxx*, *yyyy*, *zzzz*= 4-digit axis values with floating decimal point • cccc=composite field value with floating decimal point • *B*=battery flag, *N* or *F*

Command	Description	Response
I	Identification command	*:I6105<sr><sn><cd>B<LF>* • *sr*=10-character software revision • *sn*=8-character serial number • *cd*=8-character calibration date • *B*=battery flag, *N* or *F*

The Identification command, **I**, may also be used as the first command sent. The command will turn on the laser. Once communication between the probe and the HI-6113 is established, the return string will be sent. Subsequent **I** commands immediately send the return string.

Command	Description	Response
TC	Read temperature in Centigrade	*:Txxxx.<LF>*
TF	Read temperature in Fahrenheit	*:Txxxx.<LF>*
<Null><CR>	Send the ASCII null character	*:N<LF>*

<Null><CR> is a special command that can be used as the initial command to the field probe **after** it is turned on.

Additional Commands for 7007-002/Laser Only

Command	Description	Probe Response
i	Laser data interface identification string	*:i6113<sr><sn><LF>* • *sr*=10-character software revision • *sn*=8-character serial number
n	Read laser current	*:nx.xxx. <LF>*
o	Laser OFF command	*:o<LF>* The laser and all LEDs except the green Power LED will turn off
r	Laser ON command	*:r<LF>* The blue Laser LED will illuminate immediately, then the yellow Receive LED will illuminate a few seconds after, indicating the probe is ready for operation

The Laser ON command, **r**, should be the first command sent.

Command	Description	Probe Response
tc	Read temperature in Centigrade	*:txxxx.<LF>*
tf	Read temperature in Fahrenheit	*:txxxx.<LF>*

Error Codes

If an error occurs, the probe will respond with one of the following strings. These strings begin with a colon and end with a carriage return.

E1	Communication error (for example, overflow)
E2	Buffer full error; too many characters contained between the start character and carriage return sequence
E3	Received command is invalid
E4	Received parameter is invalid
E5	Hardware error (for example, EEPROM failure)
E6	Parity error
E7	(For 7007-002/laser only) Probe commands are not available unless the field probe is powered on. To power on the probe, send the Laser ON command, **r**. For more information on the **r** command, see page 30.
E9	Received command is invalid

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Appendix A: Warranty

Scope and Duration of Warranties

Seller warrants to Buyer that the Products to be delivered hereunder will be (1) free from defects in material, manufacturing workmanship, and title, and (2) conform to the Seller's applicable product descriptions and specifications, if any, contained in or attached to Seller's quotation. If no product descriptions or specifications are contained in or attached to the quotation, Seller's applicable product descriptions and specifications in effect on the date of shipment shall apply. The criteria for all testing shall be Seller's applicable product specifications utilizing factory-specified calibration and test procedures and instruments.

All product warranties, except the warranty of title, and all remedies for warranty failures are limited to three years.

Product Warranted	Duration of Warranty Period
Model 7007-001: EMSense™ EMF Probe Plug-in Card, Battery	3 Years
Model 7007-002: EMSense™ EMF Probe Plug-in Card, Laser	3 Years

Any product or part furnished to Buyer during the warranty period to correct a warranty failure shall be warranted to the extent of the unexpired term of the warranty applicable to the repaired or replaced product.

The warranty period shall commence on the date the product is delivered to Buyer; however, if Seller assembles the product, or provides technical direction of such assembly, the warranty period for such product shall commence on the date the assembly of the product is complete. Notwithstanding the foregoing, in the event that the assembly is delayed for a total of thirty (30) days or more from the date of delivery for any reason or reasons for which Seller is not responsible, the warranty period for such product may, at Seller's options, commence on the thirtieth (30th) day from the date such product is delivered to Buyer. Buyer shall promptly inspect all products upon delivery. No claims for shortages will be allowed unless shortages are reported to Seller in writing within ten (10) days after delivery. No other claims against Seller will be allowed unless asserted in writing within thirty (30) days after delivery (or assembly if the products are to be assembled by Seller) or, in the case of alleged breach of warranty, within the applicable warranty period.

Warranty Exclusions

Except as set forth in any applicable patent indemnity, the foregoing warranties are exclusive and in lieu of all other warranties, whether written, oral, express, implied, or statutory. EXCEPT AS EXPRESSLY STATED ABOVE, SELLER MAKES NO WARRANTY, EXPRESS OR IMPLIED, BY STATUTE OR OTHERWISE, WHETHER OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE OR USE OR OTHERWISE ON THE PRODUCTS, OR ON ANY PARTS OR LABOR FURNISHED DURING THE SALE, DELIVERY OR SERVICING OF THE PRODUCTS. THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF.

Warranty coverage does not include any defect or performance deficiency (including failure to conform to product descriptions or specifications) which results, in whole or in part, from (1) negligent storage or handling of the product by Buyer, its employees, agents, or contractors, (2) failure of Buyer to prepare the site or provide an operating environmental condition in compliance with any applicable instructions or recommendations of Seller, (3) absence of any product, component, or accessory recommended by Seller but omitted at Buyer's direction, (4) any design, specification, or instruction furnished by Buyer, its employees, agents or contractors, (5) any alteration of the product by persons other than Seller, (6) combining Seller's product with any product furnished by others, (7) combining incompatible products of Seller, (8) interference with the radio frequency fields due to conditions or causes outside the product as furnished by Seller, (9) improper or extraordinary use of the product, or failure to comply with any applicable instructions or recommendations of Seller including maintenance, calibration and cleaning procedures and intervals, or (10) acts of God, acts of civil or military authority, fires, floods, strikes or other labor disturbances, war, riot, or any other causes beyond the reasonable control of Seller.

This warranty does not include (1) batteries, (2) cables, (3) gasket, (4) fingerstock, or any item that is designed to be consumable. Seller does not warranty products of others which are not included in Seller's published price lists.

Buyer's Remedies

If Seller determines that any product fails to meet any warranty during the applicable warranty period, Seller shall correct any such failure by either, at its option, repairing, adjusting, or replacing without charge to Buyer any defective or nonconforming product, or part or parts of the product. Seller shall have the option to furnish either new or exchange replacement parts or assemblies.

Warranty service shall be performed at the Seller's factory, or the Buyer's site at the sole discretion of the Seller. Within the warranty period, the Buyer shall be responsible for all transportation to the Seller's factory, and the Seller shall be responsible for transportation of goods to the Buyer's site.

Within the contiguous 48 United States, warranty service performed during the applicable warranty period will be performed without charge to Buyer during Seller's normal business hours. After the warranty period, service will be performed at Seller's prevailing service rates. Subject to the availability of personnel, after-hours service is available upon request at an additional charge.

Outside the contiguous 48 United States, travel and per diem expenses, when required, shall be the responsibility of the Buyer, or End User, whichever is applicable regardless of the warranty period.

The remedies set forth herein are conditioned upon Buyer promptly notifying Seller within the applicable warranty period of any defect or non-conformance and making the product available for correction.

The preceding paragraphs set forth Buyer's exclusive remedies and Seller's sole liability for claims based on failure of the products to meet any warranty, whether the claim is in contract, warranty, tort (including negligence and strict liability) or otherwise, and however instituted, and, upon the expiration of the applicable warranty period, all such liability shall terminate. IN NO EVENT SHALL SELLER BE LIABLE TO BUYER FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND ARISING OUT OF, OR AS A RESULT OF, THE SALE, DELIVERY, NON-DELIVERY, SERVICING, ASSEMBLING, USE OR LOSS OF USE OF THE PRODUCTS OR ANY PART THEREOF, OR FOR ANY CHARGES OR EXPENSES OF ANY NATURE INCURRED WITHOUT SELLER'S WRITTEN CONSENT DESPITE ANY NEGLIGENCE ON BEHALF OF THE SELLER. IN NO EVENT SHALL SELLER'S LIABILITIES UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE OF THE PRODUCT IN RESPECT OF WHICH DAMAGES ARE CLAIMED. This agreement shall be construed in accordance with laws of the State of Texas. In the event that any provision hereof shall violate any applicable statute, ordinance, or rule of law, such provision shall be ineffective to the extent of such violation without invalidating any other provision hereof.

Any controversy or claim arising out of or relating to the sale, delivery, non-delivery, servicing, assembling, use or loss of use of the products or any part thereof or for any charges or expenses in connection therewith shall be settled in Austin, Texas by arbitration in accordance with the Rules of the American Arbitration Association, and judgment upon the award rendered by the Arbitrator may be entered in either the Federal District Court for the Western District of Texas or the State District Court in Austin, Texas, all of the parties hereto consenting to personal jurisdiction of the venue of such court and hereby waive the right to demand a jury trial under any of these actions.

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Appendix B: EC Declaration of Conformity

ETS-Lindgren Inc. declares these products to be in conformity with the following standards, following the provisions of EMC-Directive 2004/108/EC:

Model 7007-001: EMSense™ EMF Probe Plug-in Card, Battery

Model 7007-002: EMSense™ EMF Probe Plug-in Card, Laser

Emission:	EN 61326-1:2006, Class B Electrical equipment for measurement, control, and laboratory use.
Immunity:	EN 61326-1:2006, Industrial level, performance criteria A Electrical equipment for measurement, control, and laboratory use.

Technical Construction Files are available upon request.